

Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1. (Previously Presented): A semiconductor device in which a plurality of semiconductor elements are formed on a substrate, wherein

in at least semiconductor elements, among said plurality of semiconductor elements, that samples data to be supplied to other semiconductor elements, a channel width of a channel region formed in a semiconductor layer to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is neither vertical to nor parallel with regard to a side direction of said substrate; and

in at least the semiconductor elements, among said plurality of semiconductor elements, that are connected to a signal line to which data to be supplied to a drain of a corresponding one of said plurality of semiconductor elements is input and which is common to said plurality of semiconductor elements and that output data from the signal line, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of the signal line.

Claim 2. (Previously Presented): The semiconductor device according to claim 1 wherein

said laser annealing is performed to poly-crystallize an amorphous semiconductor layer and obtain a polycrystalline semiconductor layer.

Claim 3. (Previously Presented): A semiconductor device in which a plurality of semiconductor elements are formed on a substrate, wherein

in at least semiconductor elements, among said plurality of semiconductor elements, that samples data to be supplied to other semiconductor

elements, a channel width of a channel region formed in a semiconductor layer to which laser annealing is applied is larger than a channel length thereof, a channel width direction is formed in a direction different from a major-axis direction and a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing, and a channel width direction is neither vertical nor parallel with regard to at least two different major side directions of said substrate; and

in at least the semiconductor elements, among said plurality of semiconductor elements, that are connected to a signal line to which data to be supplied to a drain of a corresponding one of said plurality of semiconductor elements is input and which is common to said plurality of semiconductor elements and that output data from the signal line, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of the signal line.

Claim 4 (Original): The semiconductor device according to claim 3 wherein said laser annealing is performed to poly-crystallize an amorphous semiconductor layer and obtain a polycrystalline semiconductor layer.

Claim 5. (Previously Presented): A display device, comprising:

- a plurality of pixel electrodes arranged on a substrate;
- a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and
- a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first thin-film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, a channel width direction is neither vertical to nor parallel with regard to a side direction of said substrate; and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 6. (Original): The display device according to claim 5 wherein

among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width is larger than the channel length and the channel width direction is formed in a direction different from the side direction of said substrate

are used, in said display drive circuit, as sampling transistors for sampling video signals at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors.

Claim 7. (Original): The display device according to claim 5 wherein

said display drive circuit comprises:

a video signal line to which the video signals are supplied from outside, sampling transistors for sampling the video signals from said video signal line at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors, and a shift register for controlling switching operation of said sampling transistors,

and wherein, among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width is larger than the channel length and the channel width direction is formed in a direction different from a side direction of said substrate are used in said sampling transistors and the shift register.

Claim 8. (Original): The display device according to claim 5 wherein said laser annealing is performed to poly-crystallize an amorphous semiconductor film and obtain a polycrystalline semiconductor film.

Claim 9. (Previously Presented): A display device, comprising:
a plurality of pixel electrodes arranged on a substrate;
a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and
a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a side direction of said substrate,

said channel width direction of said some or all of second thin-film transistors is set to a direction of about 45° relative to any one or all of a plurality of side directions of said substrate; and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 10. (Previously Presented): A display device, comprising:

a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a major-axis direction and a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing; and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 11. (Original): The display device according to claim 10 wherein
among said plurality of second thin-film transistors, said some or all of
second thin-film transistors in which the channel width is larger than the channel
length and the channel width direction is formed in a direction different from the
major-axis direction and/or the minor-axis direction of said laser-beam irradiated
region

are used, in said display drive circuit, as sampling transistors for
sampling video signals at a predetermined timing and supplying said display
signals to the corresponding plurality of first thin-film transistors.

Claim 12. (Original): The display device according to claim 10 wherein
said display drive circuit comprises:
a video signal line to which the video signals are supplied from outside,
sampling transistors for sampling the video signals from said video signal line at a
predetermined timing and supplying said display signals to the corresponding
plurality of first thin-film transistors, and a shift register for controlling switching
operation of said sampling transistors,

and wherein, among said plurality of second thin-film transistors, said
some or all of second thin-film transistors in which the channel width is larger than
the channel length and the channel width direction is formed in a direction different
from the major-axis direction and/or the minor-axis direction of said laser-beam
irradiated region are used in said sampling transistors and the shift register.

Claim 13. (Original): The display device according to claim 10 wherein
said laser annealing is performed to poly-crystalline semiconductor
film.

Claim 14. (Previously Presented): A display device, comprising:

a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a major-axis direction and/or a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing,

said channel width direction of said some or all of second thin-film transistors is set to a direction of about 45° relative to the major-axis direction and/or the minor-axis direction of said laser-beam irradiated region, and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 15. (Previously Presented): A liquid crystal display device comprising,
a plurality of pixel electrodes arranged on one of a pair of substrates holding a liquid crystal therebetween;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating the liquid crystal to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors,

channel regions of said plurality of first and second thin-film transistors being formed in a semiconductor film to which laser annealing is applied,

in some or all of said plurality of second thin-film transistors, a channel width being larger than a channel length, and a channel width direction of some or all of second thin-film transistors being formed non-parallel with and non-orthogonal to a channel width direction of said first thin-film transistors, and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 16. (Original): The liquid crystal display device according to claim 15 wherein

among said plurality of second thin-film transistors, in said some or all of second thin-film transistors in which the channel width direction is formed non-parallel with and non-orthogonal to the channel width direction of said first thin-film transistors,

the channel width direction is further formed in a direction different from a side direction of said substrate or in a direction different from a major-axis

direction and/or a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing.

Claim 17. (Previously Presented): A liquid crystal display device, comprising:

a plurality of pixel electrodes arranged on one of a pair of substrates holding a liquid crystal therebetween;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating the liquid crystal to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors,

channel regions of said plurality of first and second thin-film transistors being formed in a semiconductor film to which laser annealing is applied, and

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first thin-film transistors, a channel width being larger than a channel length, and a channel width direction of some or all of second thin-film transistors being formed non-parallel with and non-orthogonal to a channel width direction of said first thin-film transistors,

wherein

among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width direction is formed non-parallel with and non-orthogonal to the channel width direction of said first thin-film transistors are used, in said display drive circuit, as sampling transistors for

sampling video signals at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors, and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 18. (Previously Presented): A liquid crystal display device, comprising:

a plurality of pixel electrodes arranged on one of a pair of substrates holding a liquid crystal therebetween;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating the liquid crystal to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors,

channel regions of said plurality of first and second thin-film transistors being formed in a semiconductor film to which laser annealing is applied, and

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width being larger than a channel length, a channel width direction of some or all of second thin-film transistors being formed non-parallel with and non-orthogonal to a channel width direction of said first thin-film transistors, and a channel width is larger than a channel length and a channel

width direction differs from the direction of the sides of the substrate and from a channel width direction of the first-thin film transistors in at least the sampling transistors among the second thin-film transistors,

wherein

said display drive circuit comprises:

a video signal line to which the video signals are supplied from outside, sampling transistors for sampling the video signals from said video signal line at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors, and a shift register for controlling switching operation of said sampling transistors,

wherein, among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width direction is formed non-parallel with and non-orthogonal to the channel width direction of said first thin-film transistors are used in said sampling transistors and the shift register, and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 19. (Original): The liquid crystal display device according to claim 15 wherein

said laser annealing is performed to poly-crystallize an amorphous semiconductor film and obtain a polycrystalline semiconductor film.

Claim 20. (Previously Presented): A liquid crystal display device, comprising:

a plurality of pixel electrodes arranged on one of a pair of substrates holding a liquid crystal therebetween;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating the liquid crystal to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors,

channel regions of said plurality of first and second thin-film transistors being formed in a semiconductor film to which laser annealing is applied, and

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said thin-film transistors, a channel width being larger than a channel length, and a channel width direction of some or all of second thin-film transistors being formed non-parallel with and non-orthogonal to a channel width direction of said first thin-film transistors,

wherein

said channel width direction of the channel region of said some or all of second thin-film transistors is set to a direction of about 45° relative to the channel width direction of said first thin-film transistors, and

in at least the semiconductor elements, among said plurality of semiconductor elements, that are connected to a signal line to which data to be supplied to a drain of a corresponding one of said plurality of semiconductor elements is input and which is common to said plurality of semiconductor elements

and that output data from the signal line, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of the signal line.

Claim 21. (Previously Presented): A display device, comprising:

a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first thin-film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a major-axis direction and/or a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing,

the channel width of some or all of said plurality of second thin-film transistors is formed neither parallel with nor orthogonal to a channel width direction of said plurality of first thin-film transistors, and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a

channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 22. (Previously Presented): A display device, comprising:

a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, a channel width direction is formed in a direction different from a major-axis direction and/or a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing, and a channel width is larger than a channel length and a channel width direction differs from the direction of the size of the substrate and from a channel width direction of the first-thin film transistors than at least the sampling transistors among the second thin-film transistors,

the channel width of some or all of said plurality of second thin-film transistors is formed neither parallel with nor orthogonal to a channel width direction of said plurality of first thin-film transistors, and

said display drive circuit comprises:

a video signal line to which the video signals are supplied from outside, sampling transistors for sampling the video signals from said video signal line at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors, and a shift register for controlling switching operation of said sampling transistors,

wherein, among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width is larger than the channel length and the channel width direction is formed in a direction different from the major-axis direction and/or the minor-axis direction of said laser beam irradiated region are used in said sampling transistors and the shift register, and

in at least transistors, among said plurality of second thin-film transistors, that are connected to a video signal line to a corresponding one of said first thin-film transistors, a channel width of a channel region is larger than a channel length thereof, and the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 23. (Original): A display device, comprising:

a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in at least transistors, among said plurality of second thin-film transistors, that samples display data to be supplied to said first-thin film

transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, a channel width direction is neither vertical to nor parallel with regard to a side direction of said substrate, and said channel width direction is formed in a direction different from a major-axis direction and a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing.

Claim 24. (Previously Presented): The display device according to claim 5 wherein

a data line is connected to a corresponding one of said first thin-film transistors, and

in at least transistors, among said plurality of second thin-film transistors, that output display data, the channel width direction is neither parallel with nor orthogonal to the column direction of said display device which is the primary direction of extension of said data line.

Claim 25. (Previously Presented): The display device according to claim 23 wherein

in at least transistors, among said plurality of second thin-film transistors, that are connected to said video signal line and output display data from said video signal line to a corresponding one of said first thin-film transistors, the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.

Claim 26. (Previously Presented): The display device according to claim 9 wherein

a data line is connected to a corresponding one of said first thin-film transistors, and

in at least transistors, among said plurality of second thin-film transistors, that output display data, the channel width direction is neither parallel with nor orthogonal to the column direction of said display device which is the primary direction of extension of said data line.

Claim 27. (Previously Presented): The display device according to claim 25 wherein

in at least transistors, among said plurality of second thin-film transistors, that are connected to said video signal line and output display data from said video signal line to a corresponding one of said first thin-film transistors, the channel width direction is neither parallel with nor orthogonal to a primary direction of extension of said video signal line.